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54. Name of Invention: COMPRESSED AND EXPANDED GAS INDUCTION DEVICE IN MULTIPOLAR TYPE ROTARY ENGINE
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What is claimed is:

1. In a multipolar type rotary engine in which a cylinder 2 for inhalation compression and a cylinder 3 for expansion exhaust are parallel disposed facing each other across a cylinder 1 for ignition stagnation, the cylinder 1 for ignition stagnation communicatively being connected to the cylinder 2 for inhalation compression via a lead-in channel 15, the cylinder 1 for ignition stagnation communicatively being connected to the cylinder 3 for expansion exhaust via a lead-out channel 16, the cylinder 2 for inhalation compression and the cylinder 3 for expansion exhaust being inserted by a main shaft 8 having a plurality of rotor vanes 9 rotating in sliding touch with each inner peripheral wall of the cylinders 2 and 3, intermittent rotary vanes 10 for shielding being disposed corresponding to the number of

the rotor vanes 9 in a space for rotating the rotor vanes 9, the intermittent rotary vanes 10 shielding the space for rotating the rotor vanes 9 by appearance/disappearance of engaging/disengaging projections 11, simultaneously the intermittent rotary vanes 10 being rotated by pressing of the rotor vanes 9, a compressed and expanded gas induction device in the multipolar type rotary engine comprising:

annexing spring back material 12 to the engaging/disengaging projections 11 to energize in a disappearing direction; and

setting rotary discs 13, 13 that intervene in and close the lead-in channel 15 and the lead-out channel 16 and rotates, allocating penetration holes 17, 17 on a closed orbit and opening/closing the lead-in channel 15 and the lead-out channel 16, while touching and supporting the rotary discs 13, 13 on basic ends of the engaging/disengaging projections 11, 11 and allocating concave portions 18, 18 for sinking of the projections 11, 11 on a sliding orbit on these ends.

Detailed Description of the Invention:

The invention relates to a compressed and expanded gas induction device in a multipolar type rotary engine in which a pair of cylinders separately performing inhalation compression operation, explosion operation and expansion exhaust operation is parallel disposed and each cylinder is laid out in several poles so as to obtain several simultaneous explosions for one rotation.

A multipolar type rotary engine that is the premise for the invention has structure in which a cylinder 2 for inhalation compression and a cylinder 3 for expansion exhaust are parallel disposed facing each other across a cylinder 1 for ignition stagnation , the cylinder 1 for ignition stagnation is communicatively connected to the cylinder 2 for inhalation compression via a lead-in channel 15, the cylinder 1 for ignition stagnation is communicatively connected to the cylinder 3 for expansion exhaust via a lead-out channel 16, the cylinder 2 for inhalation compression and the cylinder 3 for expansion exhaust are inserted by a main shaft 8 having a plurality of rotor vanes 9 rotating in sliding touch with each inner peripheral wall of the cylinders 2 and 3, intermittent rotary vanes 10 for shielding are disposed corresponding to the number of the rotor vanes 9 in a space for rotating the rotor vanes 9, the intermittent rotary vane 10 shields the space for rotating the rotor vanes 9 by appearance/disappearance of engaging/disengaging projections 11, simultaneously the intermittent rotary vane 10 is rotated by pressing of the rotor vanes 9. According to the principle of the structure, mixed gas flowing in the cylinder 2 for inhalation compression is compressed by pressing of the rotor vanes 9 with rotation of the main shaft 8 and

simultaneously the compressed gas presses the intermittent rotary vane 10 for shielding. However, the engaging/disengaging projections 11 restrain the intermittent rotary vane 10 for shielding in a state of projection and therefore the intermittent rotary vane 10 for shielding is not rotated and the mixed gas is sufficiently compressed and the compressed gas is led from the lead-in channel 15 to the cylinder 1 for ignition stagnation.

At this time a lead-out channel 16 connecting to the cylinder 3 for expansion exhaust from the cylinder 1 for ignition stagnation is closed and the lead-in channel 15 will be closed just before ignition and explosion of the mixed gas in the cylinder 1 for ignition stagnation. After explosion of the mixed gas, on the contrary, the lead-out channel 16 is opened and the exploded mixed gas is expanded and the expanded gas is led in the cylinder 3 for expansion exhaust and actively rotates the rotor vanes 9 in the cylinder 3 to rotate the main shaft 8 of having each rotor vane 9.

In the cylinder 3 for expansion exhaust, smooth performance of expansion and exhaust of gas should be similarly required and restraint should be required by using the engaging/disengaging projections 11 of the intermittent rotary vane 10 for shielding for rotating the rotor vanes 9 in the constant direction. In addition, the projections 11, 11 are sunk for rotating the rotor vanes 9, 9 after inhalation/compression and expansion/ exhaust and the intermittent rotary vanes 10, 10 for shielding are rotated by pressing of the rotor vanes 9, 9.

Consequently, the important matters for the multipolar type rotary engine are as follows: accurate operation of opening/closing of the lead-in channel 15 and the lead-out channel (16); accurate operation of appearance/disappearance of the engaging/disengaging projections 11, 11 restraining and cancelling the intermittent rotary vane 10, 10 for shielding; and relation between these operations.

In addition, the operation of opening/closing of the lead-in channel 15 and the lead-out channel 16 and the operation of appearance/disappearance of the engaging/disengaging projections 11, 11 have been conventionally performed by a separate mechanism. Therefore there was the problem that the structure of the multipolar type rotary engine would become complicated and timing of these operations would not be synchronized and thereby it would be difficult to perform smooth action according to the principle of the multipolar type rotary engine.

The object of the invention is to solve this problem by annexing spring back material 12 to the engaging/disengaging projections 11 to energize in a disappearing direction and setting rotary discs 13, 13 intervening in and closing the lead-in channel 15 and the lead-out channel 16 to rotate, allocating penetration holes 17, 17 on a closed orbit and opening/closing the lead-in channel 15 and the lead-out channel 16, while touching and

supporting the rotary discs 13, 13 on basic ends of the engaging/disengaging projections 11, 11 and allocating concave portions 18, 18 for sinking of the projections 11, 11 on a sliding orbit on these ends.

According to description about the operation of the invention, the rotary discs 13, 13 are allocated by intervening in the lead-in channel 15 and the lead-out channel 16 and consequently the lead-in channel 15 and the lead-out channel16 are closed by the rotary discs 13, 13.

However, the penetration holes 17 are allocated on the closed orbit overlapping with the lead-in channel 15 and the lead-out channel 16 with rotation of the discs 13 and consequently the lead-in channel 15 and the lead-out channel 16 are opened during overlapping with the penetration holes 17 and this enables mixed gas to pass the channels.

In addition, the engaging/disengaging projections 11 are always energized by the spring back material 12 in the disappearing direction (i.e. cancelling direction of the intermittent rotary vanes 10 for shielding), but the basic ends of the engaging/disengaging projections 11, 11 are restrained in touch with the rotary discs 13 and therefore the engaging/disengaging projections 11 restrain the intermittent rotary vanes 10 for shielding while the engaging/disengaging projections 11 are kept projecting.

However, when the rotary discs 13 are rotated and the basic end of engaging/disengaging projections 11 sink in the concave portions 18 for sinking of the projection 11 disposed on the sliding orbit for sliding by energizing power of the spring back material 12, the restraint of the intermittent rotary vanes 10 for shielding is cancelled and the vanes 10 are rotated by external pressure, but the vanes 10 pass the concave portions 18 for sinking of the projections 11 and are in restrained state again. In this period the intermittent rotary vanes 10 for shielding are rotated in 1-vane section.

Consequently, if the rotation of the rotary discs 13, 13 is linked with the rotation of the main shaft 8 and the penetration holes 17, 17 and the concave portions 18, 18 for sinking of the projections 11, 11 on the rotary discs 13, 13 are disposed in synchronization with timing of opening/closing the lead-in channel 15 and the lead-out channel 16 as well as timing of appearance/disappearance of the engaging/disengaging projections 11, 11, accurate operation can be provided.

Next, embodiment of the invention is described on the basis of the drawings wherein:

Fig.1 is a longitudinal sectional front view of a bipolar type rotary engine, in which a cylinder 2 for inhalation compression and a cylinder 3 for expansion exhaust are disposed facing each other across a cylinder 1 for ignition stagnation and furthermore an inhalation room 4 and an exhaust room 5 are respectively disposed on lateral positions of the cylinder 2 for inhalation compression and the cylinder 3 for expansion exhaust and an inhalation

vent 6 and an exhaust vent 7 are respectively drilled in boundary walls of the rooms 4 and 5.

In the cylinder 2 for inhalation compression and the cylinder 3 for expansion exhaust there is internally set rotor 19 that is fastened on a loosely inserted main shaft 8 and has rotor vanes 9, 9 in sliding touch with inner peripheral walls of the cylinder 2 for inhalation compression and the cylinder 3 for expansion exhaust. Furthermore, in these cylinders intermittent rotary vanes 10 for shielding are disposed in upper and lower integrally projected swelled-out portions 2a, 3a. The intermittent rotary vanes 10 for shielding are rotated in contact with the swelled-out portions 2a, 3a and the rotor 19.

In addition, the intermittent rotary vane 10 for shielding are intermittently rotated in a state restrained and cancelled by the appearance/disappearance of engaging/disengaging projections 11, 11 and the tips of engaging/disengaging projections 11, 11 appear and disappear on the cylinder 2 for inhalation compression and the cylinder 3 for expansion exhaust and the engaging/disengaging projections 11, 11 are normally energized in the sinking direction by annexed springs 12, 12, but there is a state in which the basic ends of the engaging/disengaging projections 11, 11 are pushed and engaged to the rotary discs 13, 13 and are projected on the cylinders 2, 3.

A rotating shaft 14 of the rotary discs 13, 13.is loosely inserted in a rotating shaft 10a of the intermittent rotary vanes 10, 10 for shielding. Upper and lower over half portions of the rotary discs 13, 13 intervene in and are inserted in the wall of the cylinder 1 for ignition stagnation and then the over half portions are rotated and thereby the lead-in channel 15 and the lead-out channel 16 communicatively connected to the cylinder 2 for inhalation compression and the cylinder 3 for expansion exhaust are shut out and closed.

Then, penetration holes 17, 17 are allocated on a closed orbit on which the lead-in channel 15 and the lead-out channel 16 will be closed with rotation of the rotary discs 13, 13. Opening/closing of the lead-in channel 15 and the lead-out channel 16 is performed depending on each of processes such as inhalation, compression, explosion, expansion and exhaust in the engine.

Furthermore, concave portions 18, 18 for sinking of the projections 11, 11 are allocated on a sliding orbit to the basic ends of the engaging/disengaging projections 11, 11 on the rotary discs 13, 13. Operations of restraining and cancelling the intermittent rotary vanes 10, 10 for shielding are performed depending on each process for the engine.

In addition, the rotary discs 13, 13 are provided as an object linked with and rotated with the main shaft 8 by means of transmission such as gears (not shown) and upper and lower approximately half portions of the discs always project from the wall of the cylinder 1 for ignition stagnation. Therefore, cooling operation can be provided and deformation of the

rotary discs 13, 13 caused by heat can be prevented.

According to the device of the invention described above, appearance/disappearance of the engaging/disengaging projection 11, by which the lead-in channel 15 and the lead-out channel 16 of the multipolar type rotary engine are opened and closed and also the intermittent rotary vanes 10 for shielding is restrained and cancelled, is operated by the rotary discs 13. This results in producing an effect in which mutual operation can be accurate and extremely good timing of the operation can be got.

Brief Description of Drawings

FIG. 1 is a longitudinal sectional front view showing an embodiment of the device of the invention.

FIG. 2 is an elevation view of a rotary disc.

FIG. 3 is a longitudinal sectional view on A-A line.

FIG. 4 is a longitudinal sectional side view of a cylinder for inhalation compression

1: Cylinder for ignition stagnation
2: Cylinder for inhalation compression
3: Cylinder for expansion exhaust
8: Main shaft
9: Rotor vane
10: Intermittent rotary vane 10 for shielding
11: Engaging/disengaging projection
12: Spring back material
13: Rotary disc
15: Lead-in channel
16: Lead-out channel
17: penetration hole
18: Concave portion for sinking of projection

Fig. 1
Fig. 2
Fig. 3
Fig. 4

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発明の数 1 （全4頁）

㊹発明の名称　多極型ロータリーエンジンに於ける圧縮・膨張ガス誘導装置

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㊺特許請求の範囲

1　着火滞留用円筒1を挟んで吸入圧縮用円筒2と膨張排気用円筒3を並設配置し、着火滞留用円筒1と吸入圧縮用円筒2は導入路15で連通し、着火滞留用円筒1と膨張排気用円筒3は導出路16で連通され、吸入圧縮用円筒2及び膨張排気用円筒3には筒内周壁に摺擦して回転する複数のローター羽根9を有する主軸8が挿通され、ローター羽根9の回転空間内にローター羽根数に応じた遮蔽用間欠回転羽根10が配設され、遮蔽用間欠回転羽根10は出没する係脱突起11により回転空間を遮蔽すると共に、ローター羽根9に押されて回転する多極型ロータリーエンジンに於いて、係脱突起11に弾発材12を付設し、没失方向へ付勢したこと、導入路15及び導出路16に介入閉鎖して回転する回転円盤13，13を設置し、閉鎖軌道上に透孔17，17を配設し、導入路15及び導出路16を開閉する一方、回転円盤13，13は前記係脱突起11，11の基端と当接支持し、この基端との摺動軌道上に突起没入用凹部18，18を配設したことを特徴とする、多極型ロータリーエンジンに於ける圧縮・膨張ガス誘導装置。

発明の詳細な説明

本発明は吸入圧縮作用、爆発作用及び膨張排気作用を個別に行う気筒を一対として並設し、各気筒を数極に区画し、一回転に数個の同時爆発を得ることのできる多極型ロータリーエンジンに於ける圧縮・膨張ガス誘導装置に関するものである。

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本発明の前提となる多極型ロータリーエンジンは着火滞留用円筒1を挟んで吸入圧縮用円筒2と膨張排気用円筒3を並設配置し、着火滞留用円筒1と吸入圧縮用円筒2は導入路15で連通し、着火滞留用円筒1と膨張排気用円筒3は導出路16で連通され、吸入圧縮用円筒2及び膨張排気用円筒3には筒内周壁に摺擦して回転する複数のローター羽根9を有する主軸8が挿通され、ローター羽根9の回転空間内にローター羽根数に応じた遮蔽用間欠回転羽根10が配設され、遮蔽用間欠回転羽根10は出没する係脱突起11により回転空間を遮蔽すると共に、ローター羽根9に押されて回転する構成であり、その原理は吸入圧縮用円筒2内に流入した混合ガスが主軸8の回転に伴いローター羽根9に押されて圧縮すると同時に、遮蔽用間欠回転羽根10を押圧するが、係脱突起11が突出状態で抑止するため、該遮蔽用間欠回転羽根10は回転せず、混合ガスが充分に圧縮され、導入路15より着火滞留用円筒1に圧縮された混合ガスが誘導される。

この時、着火滞留用円筒1から膨張排気用円筒3へ通じる導出路16は閉鎖されており、着火滞留用円筒1の混合ガスに着火爆発する直前に導入路15は閉鎖され、逆に爆発後、今度は導出路16が開口して、爆発した混合ガスは膨張し、膨張排気用円筒3内に流入して、該円筒3内のローター羽根9を積極的に回転させ、各ローター羽根9の主軸8を回転させるのである。

膨張排気用円筒3に於いても、膨張・排気を円

滑に行うと共に、一定方向にローター羽根９を回転させるため、遮蔽用間欠回転羽根１０の係脱突起１１による抑止が必要であり、又、吸入・圧縮後及び膨張・排気後にローター羽根９を回転させるため、係脱突起１１，１１を没入させて遮蔽用間欠回転羽根１０，１０がローター羽根９，９に押させて回転するものである。

従つて、本多極型ロータリーエンジンは、導入路１５及び導出路１６の開閉と遮蔽用間欠回転羽根１０，１０を抑止・解除する係脱突起１１，１１の出没の正確な操作と互いの関連が重要な事項となる。

そして、従来は導入路１５及び導出路１６の開閉及び係脱突起１１，１１の出没は、それぞれ個別の機構で操作していたため、構造が複雑となり、又互いのタイミングが合わず、原理通りの円滑な作用が困難となる問題点があつた。

そこで本発明は、この問題点を解決することを目的とし、係脱突起１１に弾発材１２を付設し、没失方向へ付勢したこと、導入部１５及び導出路１６に介入閉鎖して回転する回転円盤１３，１３を設置し、閉鎖軌導上に透孔１７，１７を配設し、導入路１５及び導出路１６を開閉する一方、回転円盤１３，１３は前記係脱突起１１，１１の基端と当接支持し、この基端との摺動軌道上に突起没入用凹部１８，１８を配設したものである。

本発明の作用を説明すると、回転円盤１３が導入路１５及び導出路１６に介入して設置されているから、導入路１５及び導出路１６は回転円盤１３により閉鎖されている。

しかし、回転に伴う導入路１５及び導出路１６との重合する閉鎖軌道上に透孔１７を配設してあるから、該透孔１７と重合する間は導入路１５及び導出路１６は開口し、混合ガスを通過せしめることができる。

又、係脱突起１１は常時弾発材１２により没失方向、即ち、遮蔽用間欠回転羽根１０の解除方向に付勢されているが、基端を回転円盤１３に当接し抑えられているため、係脱突起１１は突出したままで遮蔽用間欠回転羽根１０を抑止している。

しかし、回転円盤１３が回転し、係脱突起１１の基端が摺動する摺動軌道上に設けられた突起没入用凹部１８へ弾発材１２の付勢力で没入すると、遮蔽用間欠回転羽根１０の抑止が解除され、

外圧により回転するが、突起没入用凹部１８を通過して再び抑止状態となるが、この間に遮蔽用間欠回転羽根１０は一羽根区間回転することとなる。

従つて、回転円盤１３，１３を主軸８の回転と連動させ、導入路１５及び導出路１６の開閉タイミング、更には係脱突起１１，１１の出没タイミングに合わせて回転円盤１３，１３の透孔１７，１７及び突起没入用凹部１８，１８を配設すれば、正確な操作を為すものである。

次に本発明の実施例を図面に基づいて説明する。

第１図は二極型ロータリーエンジンの縦断正面図であり、着火滞留用円筒１を挟んで吸入圧縮用円筒２と膨張排気用円筒３が設置してあり、更に吸入圧縮用円筒２の側方には吸入室４、膨張排気用円筒３の側方には排気室５が設置され、各々の境界壁には吸入口６及び排気口７が穿設してある。

吸入圧縮用円筒２及び膨張排気用円筒３内には緩挿した主軸８に固着し、吸入圧縮用円筒２及び膨張排気用円筒３の内周壁に摺擦するローター羽根９，９を有するローター１９が内装され、又、上下に一体に突設した膨出部２ａ，３ａに遮蔽用間欠回転羽根１０が配設してあり、この遮蔽用間欠回転羽根１０は膨出部２ａ，３ａ及びローター１９に接して回転する。

又、遮蔽用間欠回転羽根１０は出没する係脱突起１１，１１に抑止・解除されて間欠回転し、係脱突起１１，１１は先端を吸入圧縮用円筒２及び膨出排気用円筒３に出没し、付設したバネ１２，１２により常時は没入方向へ付勢されるが、基端が回転円盤１３，１３に突合して前記円筒２，３に突出した状態となつている。

回転円盤１３，１３は回転軸１４を遮蔽用間欠回転羽根１０，１０の回転軸１０ａに緩挿され、回転円盤１３，１３の上下過半分は着火滞留用円筒１の壁内に介入挟挿して回転し、吸入圧縮用円筒２及び膨張排気用円筒３に連通する導入路１５及び導出路１６を遮断閉鎖している。

そして、回転円盤１３，１３の回転に伴い導入路１５及び導出路１６を閉鎖する閉鎖軌道上に透孔１７，１７が配設され、導入路１５及び導出路１６の開閉をエンジンの吸入、圧縮、爆発、膨

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張、排気の各工程に応じて操作すべくしてある。

更に、回転円盤１３，１３の前記係脱突起１１，１１の基端との摺動軌道上に突起没入用凹部１８，１８を配設し、エンジンの各工程に応じて遮蔽用間欠回転羽根１０，１０の抑止、解除の操作を行うものである。

尚、回転円盤１３，１３は主軸８と歯車等の伝達手段（図示せず）により連動して回転するものとしてあり、上下の約半分が常時着火滞留用円筒１の壁より突出しているため、冷却作用を得て回転円盤１３，１３の熱に起因する変形を防いでいる。

以上の通り本発明装置は、多極型ロータリーエンジンの導入路１５と導出路１６の開閉と、遮蔽用間欠回転羽根１０の抑止・解除を行う係脱突起

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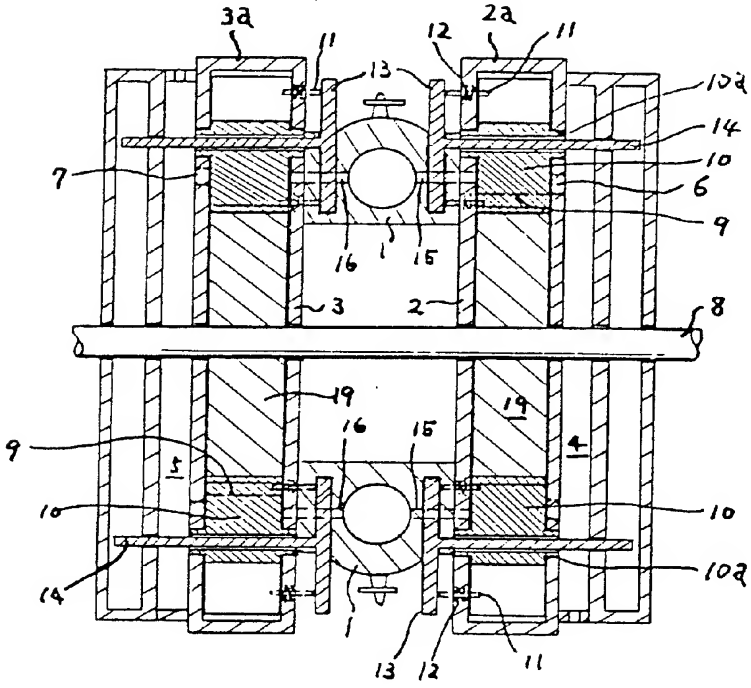
１１の出没を回転円盤１３で操作する結果、相互の操作が正確で、且つタイミングが極めて良好となる効果を発揮するものである。

図面の簡単な説明

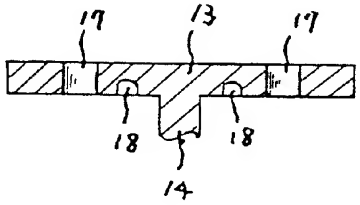
第１図は本発明装置の一実施例を示す縦断正面図、第２図は回転円盤の正面図、第３図は第２図Ａ－Ａ線断面図、第４図は吸入圧縮用円筒の縦断側面図である。

符号、１は着火滞留用円筒、２は吸入圧縮用円筒、３は膨張排気用円筒、８は主軸、９はロータ－羽根、１０は遮蔽用間欠回転羽根、１１は係脱突起、１２は弾発材、１３は回転円盤、１５は導入路、１６は導出路、１７は透孔、１８は突起没入用凹部。

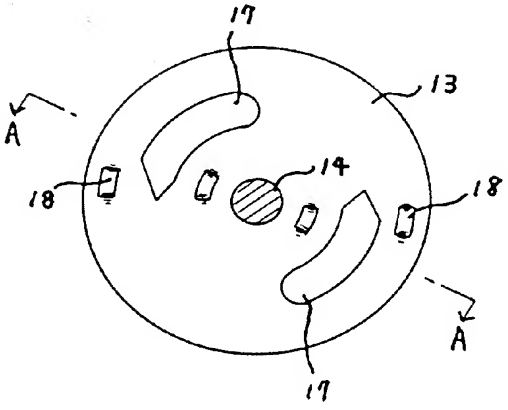
第１図



第３図



第２図



第 4 図